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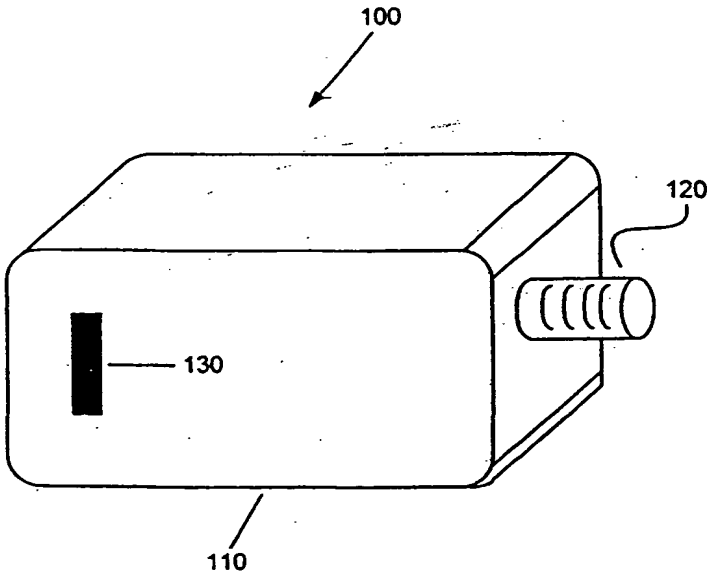
(54) Title: PORTABLE INTELLIGENT VISUAL DISPLAY APPARATUS



(57) Abstract: An apparatus is presented for displaying digital data as visual images in a format suitable for viewing by sizable audiences. The apparatus combines a computing device with a visual display device into single portable physical unit. The portable visual display apparatus for receiving and visually displaying digital data includes a computing device adapted to receive and to process the digital data, the computing device being capable of converting the data into electrical signals suitable for display as images; and a visual display device adapted to accept the electrical signals and to project images in a format suitable for viewing by a plurality of viewers, wherein the computing device and the visual display device form a single physical unit during operation.

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D E S C R I P T I O N

PORTABLE INTELLIGENT VISUAL DISPLAY APPARATUS

FIELD OF THE INVENTION

The present invention relates to an apparatus in the field of visual displays, more specifically to projectors used in large venue presentations. The invention involves a portable visual display apparatus, or projector, which contains within itself data acquiring, processing, and computing capabilities.

BACKGROUND OF THE INVENTION

Visual displays are indispensable elements of effective presentations. This is true whether the presentation is intended for a few people only, or if it has to reach an audience in the hundreds. The traditional approach to display visual images is with a simple projector. The classical projector serves its purpose well. Its success is indicated by the fact that it is still widely in use today. Typically projectors are inexpensive, lightweight, and easy to use. Projection is very effective in producing images of excellent quality for large audiences. For instance, the size of the display can be adjusted with ease. The material to be presented by slide projectors is contained on slides, which are small and lightweight. They can be thought of as efficient analog data storage devices. The amount of information they contain can accommodate a sufficient amount of detail for most conceivable purposes. Certainly a slide can easily have more information than an audience can be expected to absorb. Projectors typically have a slide carousel which can hold a

sufficient number of slides for the needs of even the most exhaustive presentation. The person delivering the presentation can carry the slides, a preloaded carousel, or the whole projector to the site of the delivery. Overhead projectors have similar characteristics, except that transparencies take the place of the slides.

If there is a problem with this traditional approach, it is precisely in the way information is stored, namely on slides. Making the slides is a photographic process. It takes time, effort, and special expertise to make slides. Once a slide is made, there is no way to change its content. Viewgraphs for overhead projectors are more flexible, but still suffer from similar problems. This is especially the case if one is preparing the kind of presentation where the quality of the images matters greatly.

There is a need for high quality images that can be produced and changed with little time and effort. Creating and updating, or changing the presentation material itself is not a problem. In the majority of cases, both text and picture images are produced on computers. There are a wide variety of word processing and graphics software packages available for these purposes. But, the easily produced and easily changeable virtual images have to be displayed. Converting digital data into slides, and losing the flexibility of the digital data in order to be able to display the actual images with a projector is a cumbersome, roundabout way of doing things. It would clearly be beneficial to bypass the slides and display the images directly.

Some electronic projectors can display images directly from a computer. These projectors typically have ports through which a cable connection to the computer is made. Fig. 5 shows one such conventional projector system. A stand-alone computer 510 is connected with a cable 530 to a stand-alone

projector 520. The projector 520 has no data processing capability, it only displays the digital images coming from the computer 510, transferred through the cable.

Such projectors are rather complicated with many necessary features to be adjusted and controlled. On the other hand, all of the data processing is done on the separate computer. Such processing involves a number of steps. The computer retrieves the data from some sort of storage medium. This medium can simply be the computer's own hard disk storage, or the data storage medium can be any other standard source such as a CD or floppy disk. After retrieving the data, the computer converts it into a graphical representation. The graphical representation then has to be converted into a pixel stream and sent to the projector. Therefore, the presenter must have a projector and a separate computer feeding this projector. The presenter must carry a computer, even assuming that the presentation venue is equipped with a projector capable of computer interfacing. In many circumstances, carrying a computer can be cumbersome. Also, the computer has many other capabilities that are not needed if it is simply used for displaying data. Thus, there is a need for a projector that is capable of displaying digital data without the need of a separate computer. The presenter, in this case, would only need to carry to the presentation the data on a storage device, or if needed, could even carry the projector and the storage. But in no case would a separate computer be needed, or be involved in the presentation.

SUMMARY OF THE INVENTION

The present invention is a projector that possesses just enough intelligence to be able to read, process, and display image-related data. The invention combines a visual display

device and a computing device into a single physical unit. This "intelligent projector" has one or more interfaces into which one can insert storage devices. These storage devices take the place of the slides, in that they contain the visual images, but in the form of digital data. Such storage devices can be floppy disks, ZIP disks, compact optical disks (CD), or other commonly available devices. The technologies of these portable storage media can encompass semiconductor-based memories, both floppy and hard disks, and various types of read-write mechanisms, like magnetic, magneto-optical, and optical devices.

In an alternate embodiment, the visual display apparatus has an additional port to connect to a network, and uses data supplied by the network for display purposes.

The user interfaces with the visual display apparatus using the built-in intelligence. Fundamentally, the main interfacing needed in presentations is the ability for the presenter to point on the images. Limiting interfacing to pointer operations provides for simplicity in the visual display apparatus through a minimal user interface. The interface operates to provide a pointer or cursor to be projected together with the images. Control of the projected pointer is accomplished with standard devices used for such purposes, such as a standard computer mouse, or a wireless mouse.

The computing device can extract the content of the data and show it in a form that it is understandable to the user. The data content can also be projected, whereupon the user selects, again with the projected pointer, the appropriate data to be displayed.

In another alternate embodiment, the visual display apparatus has a small screen operating in synchronization with the projector. The projected images and the pointer of the

minimal user interface appear as displayed images on the small screen as well. If the presenter finds it more convenient, he can view the content, or the images, on the small screen and use the displayed pointer on the small screen.

Images displayed on the screen and those projected do not have to be identical. The user can select the mode of operation. For instance, the user might choose to have the content displayed permanently on the screen and have the actual images appear only in projection. The pointer control device dictates the placement of the projected pointer and of the on-screen displayed pointer in synchronization, or alternating between the two, based on the presenter's preference.

The computing device is configured to accept data in various formats. It can accept a variety of image formats, such as bitmap format, Joint Photographic Experts Group (JPEG) format, Graphics Interchange Format(GIF), Moving Picture Expert Group (MPEG) format for animation, etc. The computing device also accepts text formats, such as simple ASCII, as well as text stored by various word processing formats, such as Microsoft Word, Lotus Word Pro, and others. The present invention could benefit from a common description language for presentations. The situation, in such a case, would be similar to what exists in printing with the availability of a common Postscript printer language. Data for presentations could then be formatted for display much like documents are prepared for printing that use a special converter that translates native data into common language. Until such a language is developed, the computing device of the present invention must be able to accept data in various formats.

In a preferred embodiment, the computing device and the visual display device are built into a common housing, permanently co-located in a single physical unit. In an

alternate embodiment, the two parts can be separated for storage, but can be fastened together by some secure means for simple carriage. Such means can be various latching mechanisms, screws and bolts, snapping together, etc. In this case, there can be more than one visual display device and more than one computing device that fit together in differing combinations. These combinations can differ in characteristics such as communication ports, user interface, or the quality of the projector. The user has a choice of the combination best suited for his needs.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features of the present invention will become apparent from the accompanying detailed description and drawings, wherein:

Fig. 1. shows an embodiment of the visual display apparatus of the present invention;

Fig. 2. shows examples of various storage media suitable for acceptance by the visual display apparatus of the present invention;

Fig. 3. shows the operation of the minimal user interface of the visual display apparatus of the present invention;

Fig. 4. shows additional ports on the visual display apparatus for extended capabilities according to an embodiment of the present invention; and

Fig. 5. shows a conventional projector controlled by a stand-alone computer.

DETAILED DESCRIPTION OF THE INVENTION

Fig. 1 shows one embodiment of the visual display apparatus 100 of the present invention. The figure is a

conceptual rendition illustrating the various parts of the visual display apparatus in a single unit. These parts include: the computing device 110, the visual display device 120, and the standardized interface for accepting storage media 130. It is important for the visual display apparatus 100 to be lightweight for obvious portability reasons. The visual display device 120 can be an electronic projector, similar to existing prior art projectors that today receive images and are controlled by computers. Since this visual display device 120 is in a single unit with the computing device 110, many controls and adjustment mechanisms of prior art electronic projectors can be omitted from the unit in favor of software control. This simplifies the display device, making it lighter and more portable, as well as less expensive. The images produced by the visual display apparatus 100 are suitable for viewing by an audience. Such an audience can vary in size from just a single person to quite a sizable number of people, such as even a stadium size audience. Price, and hence simplicity, is also important for the computing device 110. In the simplest embodiment, it runs specialized software with capabilities needed only for reading and processing the data to be displayed. This software should also be able to detect the presence of data upon the insertion of a storage device into the standardized interface 130. Once the storage device is detected, the computing device begins data processing. In this manner, the necessity of a "start" button is eliminated.

Fig. 2 shows various exemplary portable storage media and recording means which are appropriate for use with the visual display apparatus of the present invention. Basically, any type of portable storage media is appropriate for the apparatus. Fig. 2 shows disk-based or semiconductor- based storage devices. An example of an appropriate semiconductor-

based storage device 210 is a Flashcard. For disk-based storage, there are suitable hard 230 and soft disk 240 media. Suitable recording, or reading, means for appropriate disks can be magnetic 250, magneto-optic 260, and optical 270. Examples of suitable soft magnetic disks are floppy disks and ZIP disks. A suitable hard magnetic disk example is a Microdrive. Suitable hard optical disk examples are a compact disk (CD-ROM), writable compact disk (CD-R), or re-writable compact disk (CD-RW). A suitable soft magneto-optic disk is a Jaz disk. For all cases of these portable storage media, the visual display apparatus is adapted to receive data stored either encoding text to be displayed, or encoding images to be displayed.

Fig. 3 shows an embodiment of the visual display apparatus 100 with the addition of a small screen 310 and a projected image 350. They both make up a minimal user interface. This interface is defined as minimal because, keeping with the importance of simplicity, this user interface supports only the minimal functions necessary for the user to interact with the apparatus, namely performing pointing operations. As the software in the computing device detects the presence of data, it extracts and shows the content, or directory, of the data on the small screen. The displaying of the data content on the screen 330, and in projection 370, is schematically illustrated. The minimal interface supports the pointer operations of the displayed pointer 320 and of the projected pointer 360. The pointers are controlled by a well known point-and-click type device 340, like a standard computer mouse, a track-point, a wireless mouse, or even a television remote control type of device. This pointer control device 340 interfaces with the computing device through interface 380 in standard fashion, either through a cable connection or a wireless port. With the help of such a control

device the user, for instance, can select what part, and in what sequence should the visual display apparatus project the images. The projected pointer 360 permits the user to enhance the presentation. The user can select, for a given projected image, whether to have the pointer projected. If the pointer is projected, the user can move the pointer to any part of the image by appropriately applying the pointer controller device 340.

Fig. 4 shows another embodiment of the visual display apparatus 100, with additional communication ports. The visual display apparatus can be attached to a network through a network communication port 410. Such a network connection can be made using any of the known mechanisms, including over phone line using a modem, Local Area Network (LAN) connection, Wide Area Network (WAN) connection, or wireless connections. Network-attached storage would then take the place of the portable storage media described above.

The network connection can provide further enhancements to the apparatus. The computing device, instead of specialized software, can also run a standard operating system such as Microsoft Windows. In this case, the software of the computing device can be regularly updated by utilizing the network connection. Example of such software updating would be, for instance, downloading of a new plug- in to deal with a hitherto nonexistent data format.

The visual display apparatus can also provide a standard access 420 for use by a keyboard 430. Keyboard access could be preferentially used upon setting up and configuring the visual display apparatus.

Many modifications and variations of the present invention are possible in light of the above teachings, and could be apparent for those skilled in the art. For example, the built-in intelligence of the projector can be instead

combined with printing or sound devices instead of display devices. It is therefore to be understood that the detailed description is provided as an example and not as a limitation. The scope of the invention is defined by the appended claims.

CLAIMS

1. A portable visual display apparatus for receiving and visually displaying digital data comprising:

a computing device adapted to receive and to process the digital data, the computing device being capable of converting the data into electrical signals suitable for display as images; and

a visual display device adapted to accept the electrical signals and to project images in a format suitable for viewing by a plurality of viewers, wherein the computing device and the visual display device form a single physical unit during operation.

2. The portable visual display apparatus of claim 1, wherein the visual display device is a projector.

3. The portable visual display apparatus of claim 1, wherein the computing device and the visual display device are permanently co-located in a single physical unit.

4. The portable visual display apparatus of claim 1, further comprising at least one standardized interface adapted to receive and read a portable storage medium, wherein the digital data is stored on the portable storage medium.

5. The portable visual display apparatus of claim 4, wherein the portable storage medium is a hard disk.

6. The portable visual display apparatus of claim 4, wherein the portable storage medium is a soft disk.

7. The portable visual display apparatus of claim 4, wherein the portable storage medium encodes the data by magnetic means.

8. The portable visual display apparatus of claim 4, wherein the portable storage medium encodes the data by magneto-optical means.

9. The portable visual display apparatus of claim 4, wherein the portable storage medium encodes the data by optical means.

10. The portable visual display apparatus of claim 4, wherein the portable storage medium is a semiconductor based memory device.

11. The portable visual display apparatus of claim 1, wherein the digital data comprises encoded images.

12. The portable visual display apparatus of claim 1, wherein the digital data comprises encoded text.

13. The portable visual display apparatus of claim 1, wherein the computing device comprises a minimal user interface, the interface adapted to support pointer operations.

14. The portable visual display apparatus of claim 13, wherein the visual display device is adapted to project a movable projected pointer in conjunction with the projected image.

15. The portable visual display apparatus of claim 14, wherein the projected pointer placement in the projected image is dictated by a pointer control device.

16. The portable visual display apparatus of claim 13, further comprising a small screen adapted to display images.

17. The portable visual display apparatus of claim 16, wherein the computing device adapted to display a movable displayed pointer on the small screen in conjunction with a displayed image.

18. The portable visual display apparatus of claim 17, wherein the displayed pointer placement in the displayed image is dictated by a pointer control device.

19. The portable visual display apparatus of claim 13, the computing device being further capable of extracting and showing a content of the digital data, wherein a user can select a presentation course from the content of the data.

20. The portable visual display apparatus of claim 1, further comprising a network access port for standard access to a network, wherein the digital data is received from a network attached storage device.

21. The portable visual display apparatus of claim 1, further comprising a keyboard port for standard access to the computing device using a keyboard.

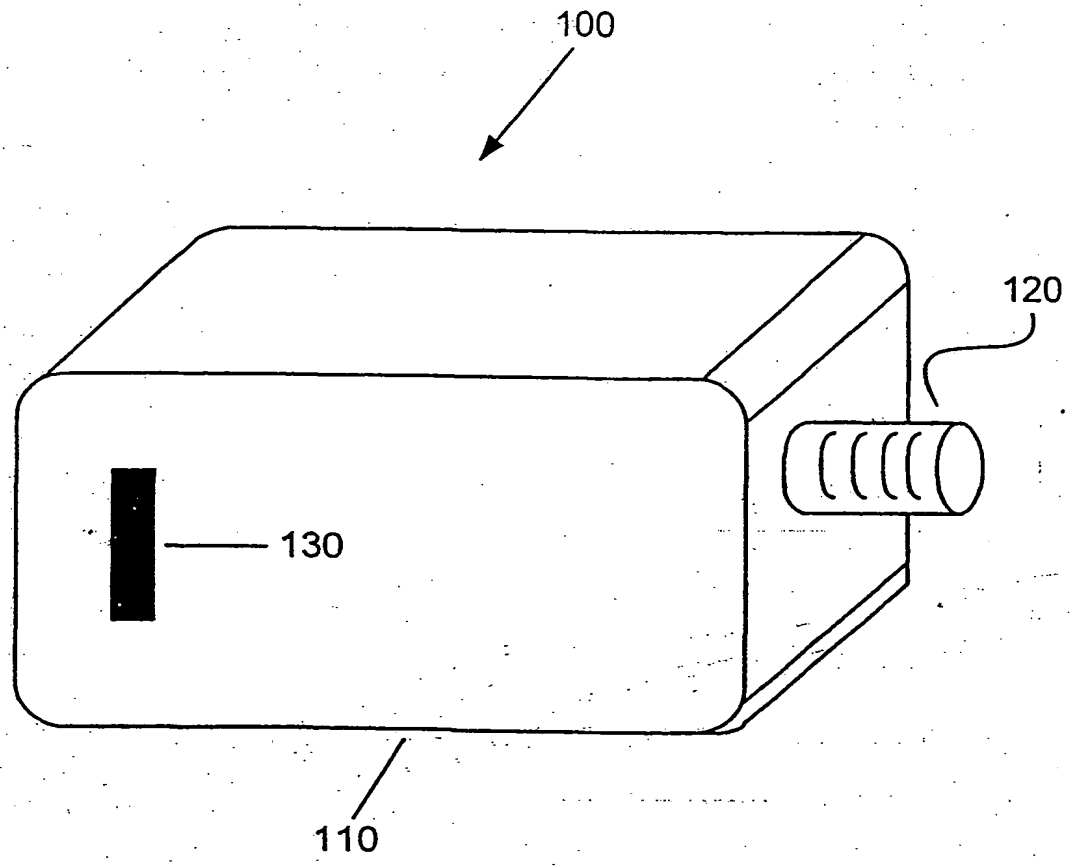
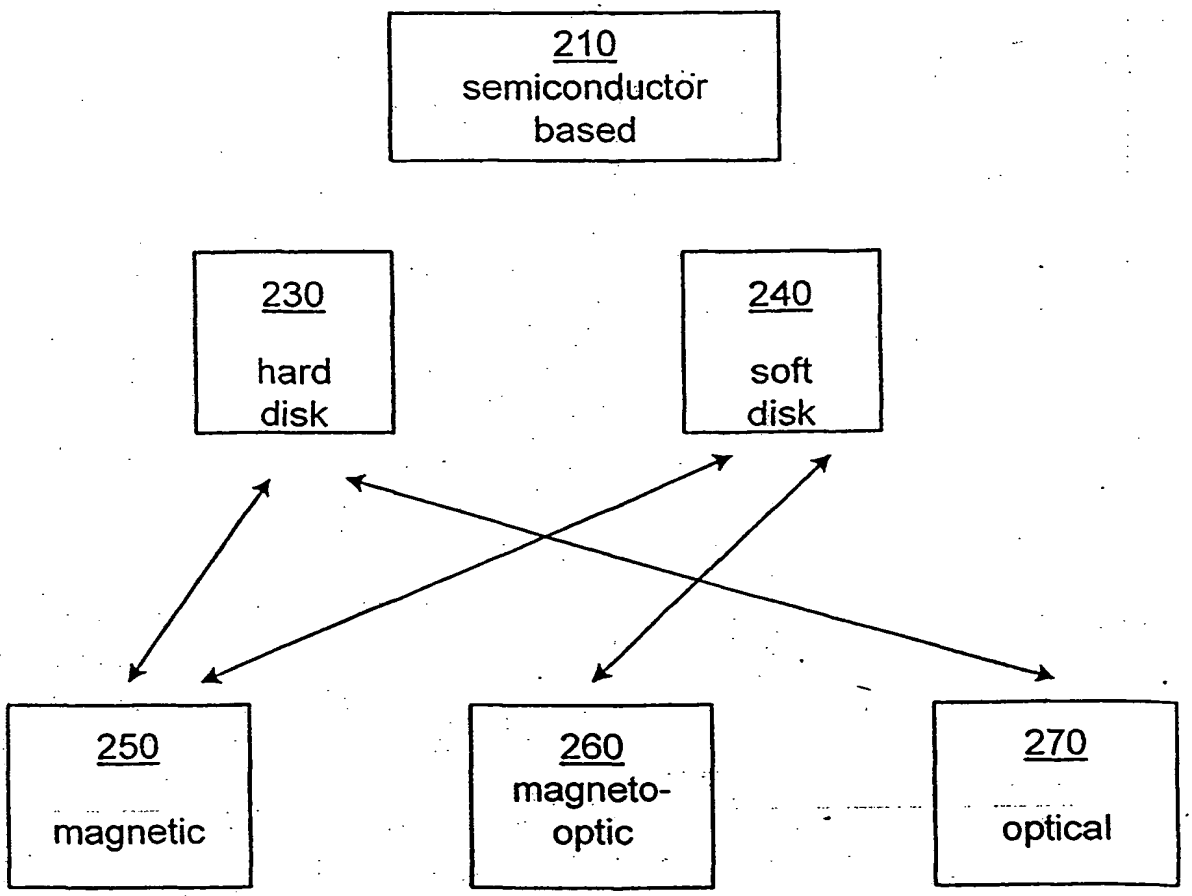


FIG. 1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disk
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soft
disk
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magnetic
260
magneto-
optic
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optical

FIG. 2

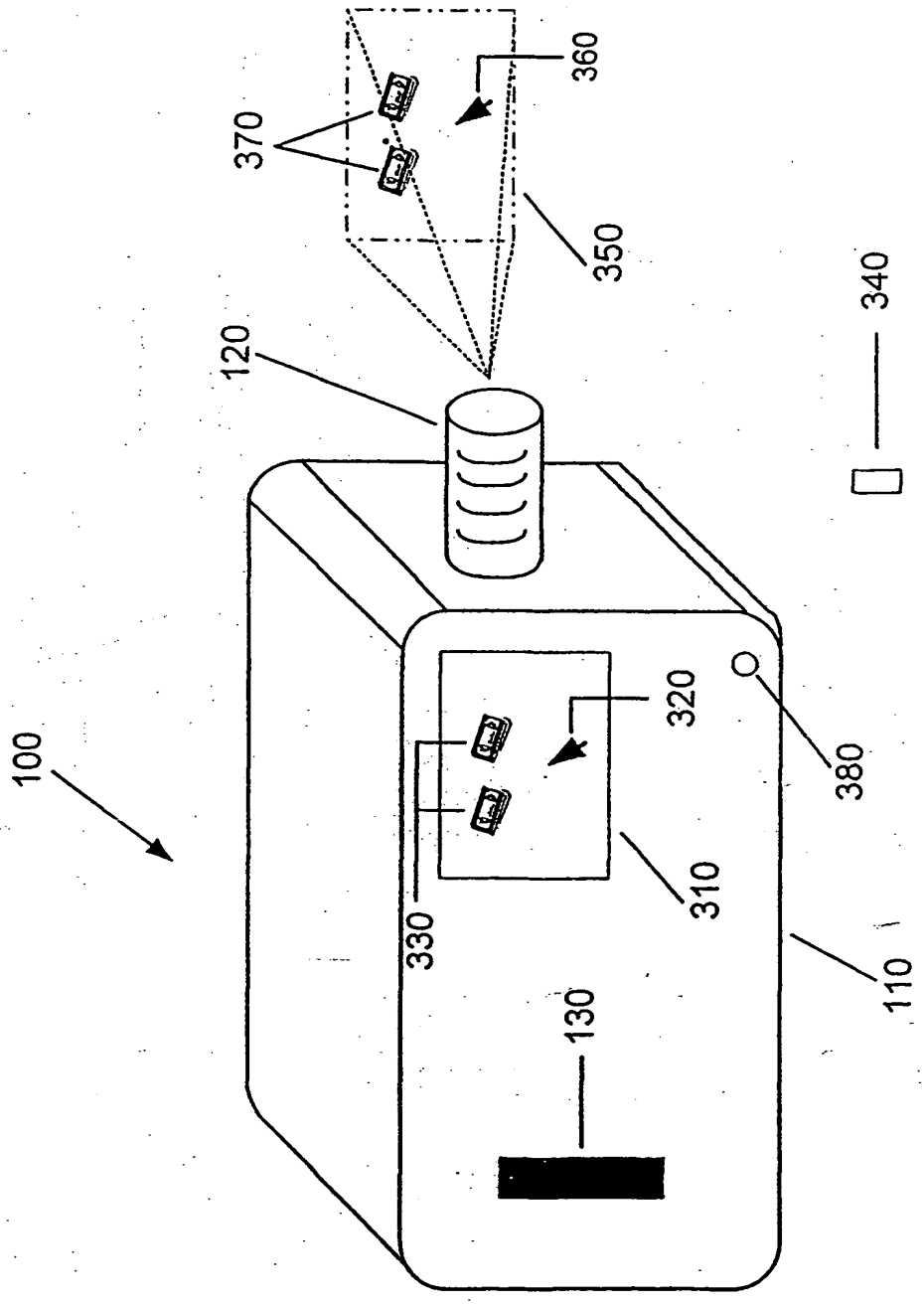

FIG. 3

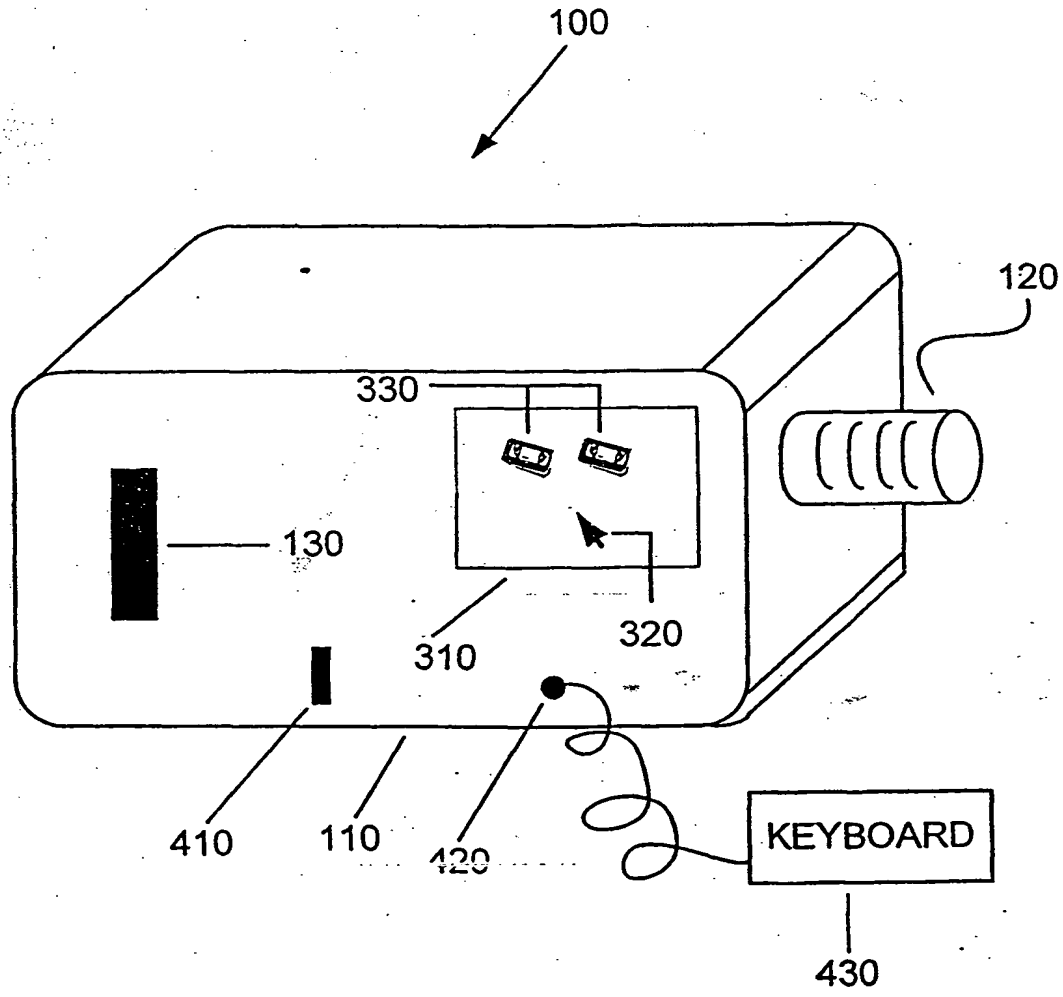

FIG. 4

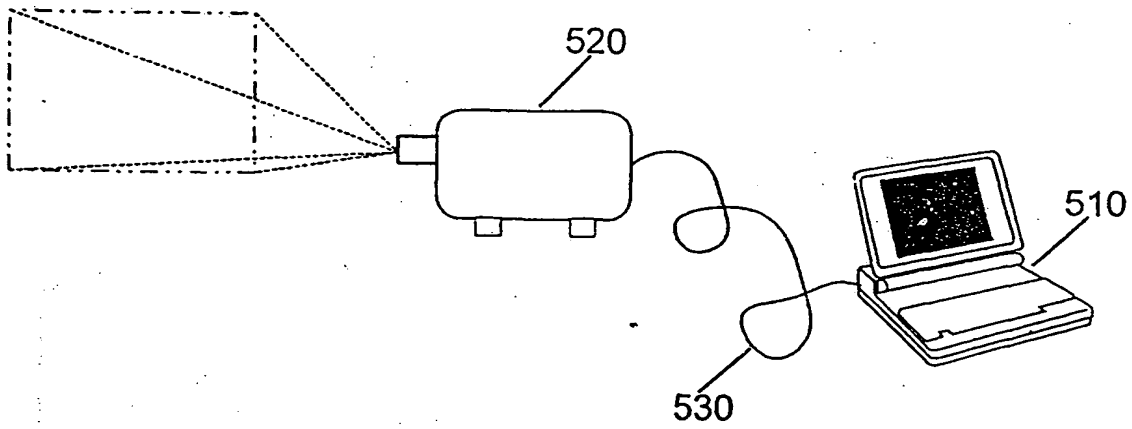

FIG. 5

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 01/10524

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04N5/74 G06F3/14

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04N G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	WO 96 12210 A (FARIS SADEG M ;REVEO INC (US); TUNG CARL (US)) 25 April 1996 (1996-04-25) page 16 -page 52	1-11
A	US 5 353 075 A (GULICK PAUL E ET AL) 4 October 1994 (1994-10-04) column 3, line 24 -column 8, line 50	1-21

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
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Information on patent family members

International Application No
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